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10/565,101	01/19/2006	Tetsuhiro Ishikawa	10517/311	7232

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EXAMINER	
BARROW, AMANDA J	

ART UNIT	PAPER NUMBER
1795	

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07/10/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/565,101	ISHIKAWA ET AL.	
	Examiner	Art Unit	
	AMANDA BARROW	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 April 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The Applicant's amendment filed 4/14/2009 was received. Claim 7 was amended.

2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action issued on 1/16/2009.

Claim Objections

3. The objection of claim 7 is withdrawn as the claim has been amended.

Claim Rejections - 35 USC § 102

4. The claim rejections under 35 U.S.C. 102(b) as being unpatentable over Sugiura on claims 1-9 are maintained. The rejection is repeated below for convenience.

5. Claims 1-9 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Sugiura et al. (US Patent Application Publication 2003/0118876 A1) (hereinafter "Sugiura").

6. Regarding claim 1, Sugiura teaches a fuel cell system (22) including a fuel cell (60), electric power storing device (capacitor 24), and electric power supplying device (power supply apparatus 15) for supplying electric power to a load (high-voltage auxiliary machine 40) from the fuel cell (60) and the electric power storing device (power supply apparatus 15) as illustrated in Figures 1 and 2 below:

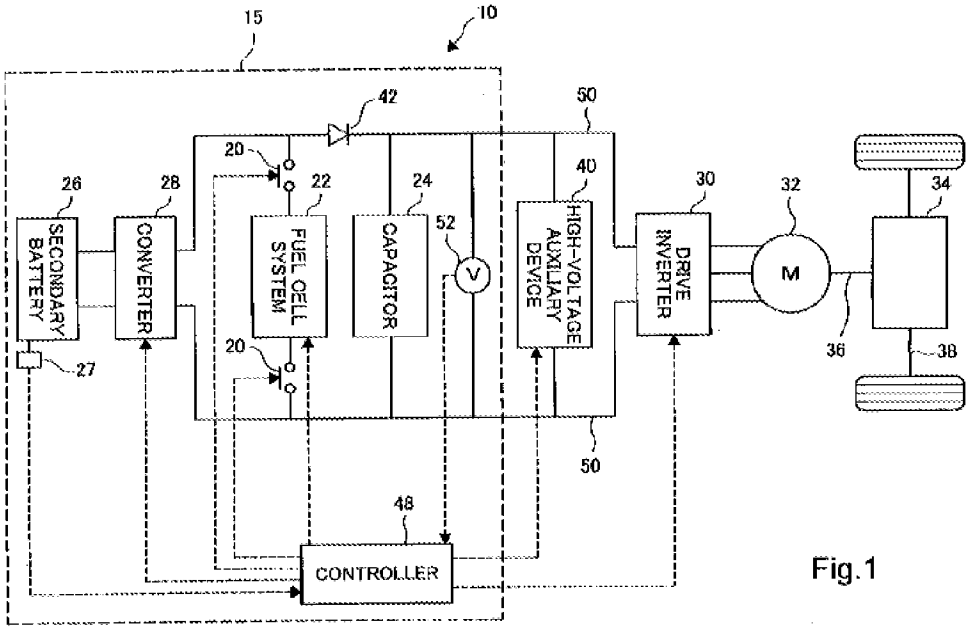
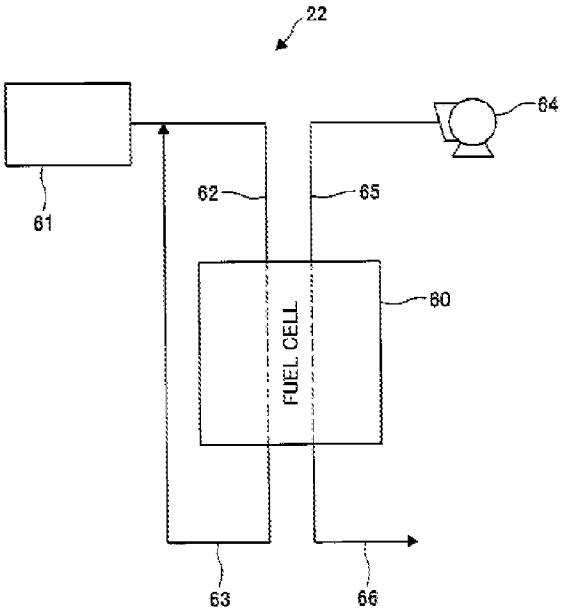

15
10
42
50
20
22
24
40
30
32
34
26
28
52
SECONDARY BATTERY
CONVERTER
FUEL CELL SYSTEM
CAPACITOR
V
HIGH-VOLTAGE AUXILIARY DEVICE
DRIVE INVERTER
M
36
38
27
20
50
48
CONTROLLER

Fig.1

Fig.2


22
64
61
62
65
60
FUEL CELL
63
66

The electric power supply device (power supply apparatus 15) includes intermittent operation means (FC suspend mode or "intermittent operating mode" – paragraphs 54-55) for stopping operation of the fuel cell (60) when an amount of electric power required by the load is smaller than a reference value (reference voltage value V_0 - paragraph 59) :

> "…when the load for which electric power is supplied from the power supply apparatus 15 is lower than a predetermined limit, control is performed to stop the generation of electric power by the fuel cell 60" (paragraph 55; also see paragraphs 58-62).

The electric power supply device (power supply apparatus 15) has the ability to start the stopped operation of the fuel cell (60) when the amount of electric power required by the load is equal to or larger than the reference value (reference voltage value V_0 - paragraph 59):

> "Figure 6 shows variations of the fuel cell 60 output voltage and the capacitor 24 voltage when the mode is switched back and forth between normal operating mode and the FC suspend mode" (paragraph 62; also see paragraphs 45-61).

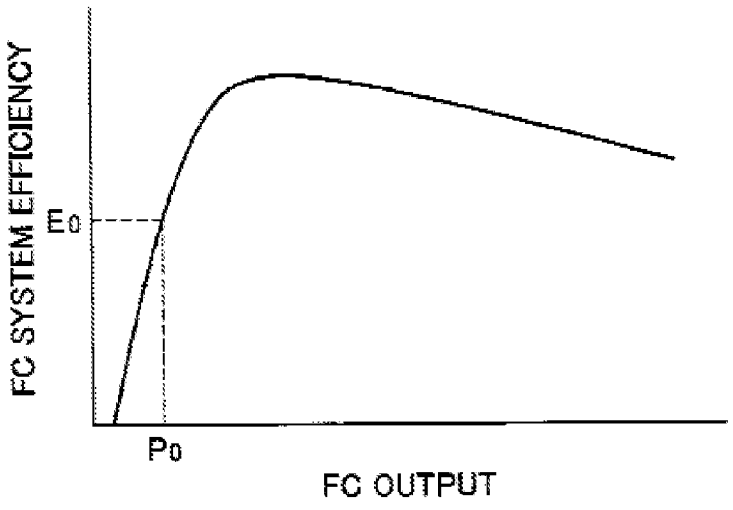
The electric power supply device (power supply apparatus 15) also has threshold adjusting means (control portion 48) for adjusting the reference value according to internal electromotive force (voltage from the circuit) in the fuel cell (60) whose operation has been stopped:

> "The controller 48 is configured as a logic circuit including a microcomputer, and more specifically, includes such components as a CPU that performs predetermined calculations based on a preset control programs, a ROM on which is stored control programs and control data necessary for execution of the various calculation processes by the CPU, a RAM to which various data needed by the various CPU–executed control programs is read and written temporarily, and an I/O port that inputs or ouputs various signals. The controller 48 receives detection signals from the voltmeter 52, signals output by the SOC monitor 27, and instruction signals that are input in connection with operation of the vehicle. It also outputs drive signals to the DC/DC converter 28, the switches 20, the fuel cell system 22, the driver inverter 30, and the high-voltage auxiliary devices 40" (paragraph 44).

Also, figure 4B (shown below) shows the relationship between the output and energy efficiency of the fuel cell 60. "The value of the output voltage, or output power, …changes depending on the internal temperature of the fuel cell 60," (paragraph 46); therefore, it is obvious that the output power on the graph, P_0, which is related to the output voltage of the fuel cell, will have a different value and therefore the reference value is adjusted. For a more detailed explanation, please see paragraphs 46, 56, 57, 78 and 79. Also, the threshold adjusting means is more plainly stated in paragraph 78:

> "As a third embodiment, a control method will be described below in which different values are used as the reference voltage values employed when determining the timing for switching between the normal operating mode and the FC suspend mode. The reference voltage used for determining the timing of closing the switches 20 may be adjusted."

Fig.4(B)



Regarding claim 2, Sugiura teaches that the threshold value adjusting means (controller 48) decreases the reference value according to a decrease in the internal electromotive force (voltage from the circuit) in the fuel cell (60) so that a time in which the operation of the fuel cell

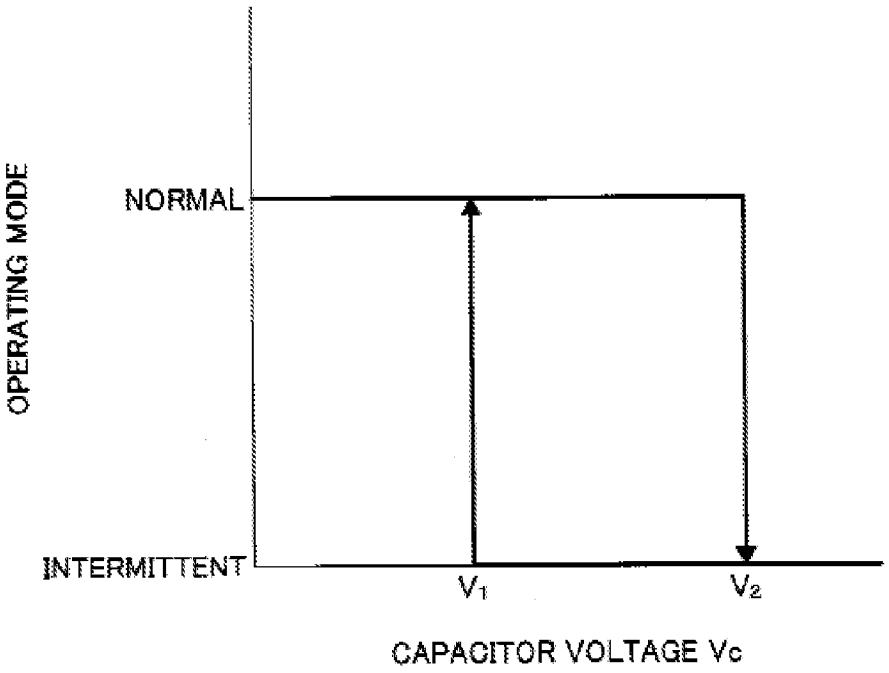
(60) is relatively advanced. This is documented in paragraph 78 and is quoted above. The threshold value adjusting means (controller 48) takes into account signals from the voltmeter 52, SOC monitor 27, and instruction signals that are input in connection with operation of the vehicle and is able to put the fuel cell back into a normal operation mode in a timely manner by reducing the reference value (paragraphs 36-80).

Regarding claim 3, Sugiura teaches that the threshold value adjusting means (control portion 48) stores data related to the reference value that needs to be set according to the internal electromotive force (voltage in the circuit) in the fuel cell (60). Again, see paragraph 44 quoted above.

Regarding claim 4, Sugiura teaches that the fuel cell system (22) has a first reference value (V_1) and second reference value (V_2) that is larger than the first value and the intermittent operation means stops the operation of the fuel cell (30) when the amount of electric power required by the load is smaller than the first reference value (V_1) and starts the stopped operation of the fuel cell when the amount of electric power required by the load is equal to or larger than the second reference value (V_2):

> "Figure 8 (shown below) shows two different reference voltages for use in the determination of switching between the intermittent driving mode and the FC suspend mode. In this embodiment, the first reference voltage V_1 used when the mode is to be switched from the FC suspend mode to the normal operating mode is set to be lower than the second reference voltage V_2 used when the mode is to be switched from the normal operating mode to the FC suspend mode" (paragraph 79).

Fig.8



Also regarding claim 4, the threshold adjusting means (controller 48) adjusts the second reference value according to the internal electromotive force (voltage of the circuit) in the fuel cell (20) whose operation has been stopped which is quoted above from paragraphs 44 and 46 in the section regarding claim 2 and further details can be found in paragraphs 56, 57, 78 and 79.

Regarding claim 5, the fuel cell system (22) contains a threshold value adjusting means (controller 48) that decreases the second reference value (V_2) according to a decrease in the internal electromotive force (voltage in the circuit) in the fuel cell (60) such that a time at which the operation of the fuel cell (20) is started is relatively advanced. This is not explicitly stated but can be inferred from the information given. As already stated and shown in Figure 4B, there is a relationship between the level of output and the energy efficiency of the fuel cell. The value of the output voltage or output power is dependent upon the internal temperature of the fuel cell

(paragraph 46). If the temperature decreases, so does the power output which causes P_0 to change position in Figure 4B. Temperature also affects the internal electromotive force (open circuit voltage). As the desired efficiency of the fuel cell is established and knowing that temperature changes the power output, these variables including the second reference value (V2) will increase or decrease depending upon the situation as the power output is related to the voltage.

Regarding claim 6, Sugiura teaches that the fuel cell system (22) is characterized in that the threshold value adjusting means (controller 48) stores data related to the second reference value (V2) that needs to be set according to the internal electromotive force (voltage in the open circuit) in the fuel cell (60). The threshold value adjusting means (controller 48) contains a ROM "on which is stored control programs and control data necessary for execution of the various calculation processes by the CPU" (paragraph 44).

Regarding claim 7, Sugiura teaches that the fuel cell system (22) has an electric power storing device (capacitor 24) that includes at least one of a secondary battery (26) or capacitor (24). This is shown in Figure 1 above and Sugiura's fuel cell system (22) contains both.

Regarding claim 8, Sugiura teaches an electric vehicle (10) including a motor (32) that generates power for the vehicle and a fuel cell system (22) that includes electric power supplying device (power supply apparatus 15) for supplying electric power to the motor (32) from a fuel cell (60) shown in Figure 1 above. The remainder of the claim is identical to claim 1 so please see the arguments regarding claim 1 for the rejection of claim 8.

Regarding claim 9, Sugiura teaches an electric vehicle (10) with all the limitations listed in claim 9. As these limitations are identical to claim 4, please see the arguments regarding claim 4 for the rejection of claim 9.

Response to Arguments

7. Applicant's arguments filed on 5/28/2009 have been fully considered but they are not persuasive.

Applicant's principal arguments are:

(a) "...the voltage in the circuit simply does not equate to the internal electromotive force claimed in the inventions of claim 1 and 8. That is, one having ordinary skill in the art would recognize that voltage from the circuit is different from the internal electromotive force in the fuel cell."

(b) The claimed invention states that the second reference value is adjusted according to the internal electromotive force in the fuel cell whose operation has been stopped. This is not described in Sugiura as it appears that start-up is linked to capacitor voltage, but not the internal electromotive force.

In response to Applicant's arguments, please consider the following comments:

(a) One of ordinary skill in the art *would* recognize the voltage from the circuit as the internal electromotive force as electromotive force is defined by the Encyclopedia Britannica as the energy per unit electric charge that is imparted by an energy source (see attached document). In other words, the electromotive force is defined to be an electrical potential difference, or

voltage difference, associated with a device, path or circuit. Therefore, the voltage from the circuit can easily be equated with the internal electromotive force and thus, Sugiura reads on the claims.

(b) Sugiura teaches that the reference value is adjusted according to the internal electromotive force ("voltage") when the fuel cell is stopped. The electric power supply device (power supply apparatus 15) has threshold adjusting means (control portion 48) for adjusting the reference value according to internal electromotive force (voltage from the circuit) in the fuel cell (60) whose operation has been stopped:

> "The controller 48 is configured as a logic circuit including a microcomputer, and more specifically, includes such components as a CPU that performs predetermined calculations based on a preset control programs, a ROM on which is stored control programs and control data necessary for execution of the various calculation processes by the CPU, a RAM to which various data needed by the various CPU–executed control programs is read and written temporarily, and an I/O port that inputs or ouputs various signals. The controller 48 receives detection signals from the voltmeter 52, signals output by the SOC monitor 27, and instruction signals that are input in connection with operation of the vehicle. It also outputs drive signals to the DC/DC converter 28, the switches 20, the fuel cell system 22, the driver inverter 30, and the high-voltage auxiliary devices 40" (paragraph 44).

Figure 4B (shown above) shows the relationship between the output and energy efficiency of the fuel cell 60. "The value of the output voltage, or output power, …changes depending on the internal temperature of the fuel cell 60," (paragraph 46); therefore, it is obvious that the output power on the graph, P_0, which is related to the output voltage of the fuel cell, will have a different value and therefore the reference value is adjusted according to the internal electromotive force ("voltage") when the fuel cell is stopped.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMANDA BARROW whose telephone number is (571)270-7867. The examiner can normally be reached on 8:30am-6pm EST. Monday-Friday, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sines can be reached on 571-272-1263. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/AMANDA BARROW/
Examiner, Art Unit 1795

/Brian J. Sines/

Supervisory Patent Examiner, Art Unit 1795